3.0 Land Records Environment

"There is something admirable about American land tenure, a free system which has permitted landless laborers and penniless immigrants to climb the agricultural ladder…"

G.S. Wehrwein, 1939, cited in Spiegel, Henry W. Land Tenure Policies at Home and Abroad. Chapel Hill, University of North Carolina, 1954, p.4

3.1 Introduction

Land and survey systems describe the way we own and transfer land. A deed describes from whom land is obtained, the extent of the land that is conveyed, the rights received in the transfer, and information about dates and people. Land and survey systems provide the formats and information that need to exist to own and transfer land.

Geographic information system (GIS) technology encompasses the concepts of both automated mapping and database management, and uses computer graphics to show spatial relationships. GIS plays a big role in improved and expanded performance of job tasks and responsibilities of users in government, environmental, industrial, and utility settings. While the potential of a GIS is limitless, the need to capture parcel information is fundamental to achieving that potential.

3.2 Cadastral and Land Records Concepts

The NILS is focused on building the tools and systems for parcel mapping and attribute relationships for digital parcel mapping. Control surveys are the spatial foundation of base maps and parcel mapping. The NILS project incorporates the capture and adjustment of control and framework data to support parcel mapping. The parcel mapping itself involves interpreting legal descriptions and expressing them as parcels. The last step is to link the mapping to transaction processing (attribute) systems. This final step provides a GIS with the richness it needs to play its supporting role of decision support.

3.2.1 Control Surveys

Control surveys are important for establishing a spatial reference framework for all parcel mapping. Regardless of the method of compilation, whether it is aerial photography, coordinate geometry or global positioning systems, the control surveys are a necessary first step. The density and accuracy of the control survey network may be varied and the way in which it is used in a parcel mapping project may vary, but it is essential and present in all GIS and parcel mapping projects.

A geodetic control network is the reference framework on which continuous and consistent mapping and surveys are based. To understand the function of geodetic control it is important to realize that a map or a plane survey is a flat representation of the real, curved world. If the maps are to become an authentic representation of the real world we have to be able to 'paste' small pieces of (flat) map contents onto a curved world. Geodetic control is

the mechanism that enables us to perform this 'pasting' accurately and consistently. Obviously, the need for geodetic control depends on the accuracy specifications of the map (GIS), the extent of area being mapped (the larger the area, the larger the deviation between a curved surface and a plane), and the desire for compatibility with other mapping or GIS projects.

3.2.2 Geodetic Datum

NILS - as both a data model and a software solution - will support user-defined implementations that have the datum, coordinate systems, projections, ellipsoids, and spatial references as chosen by the user. NILS will not dictate any of these as standard, but will enable all of them.

A datum is defined as any numerical or geometrical quantity or set of quantities which serve as a reference or base for other quantities. Traditionally, two types of datums are used: horizontal and vertical.

A horizontal datum is a surface of constant values which forms the basis for the computations of horizontal control surveys. In a horizontal datum a reference ellipsoid is used as a mathematical approximation of the shape of the earth. Five parameters are required to define a horizontal datum: two to specify the dimensions of the ellipsoid, two to specify the location of an initial point (origin), and one to specify the orientation (i.e., north) of the coordinate system. The two main horizontal datums used in the U.S. are the North American Datum of 1927 (NAD27) and the North American Datum of 1983 (NAD83).

In 1986, NAD83 replaced NAD27 because the latter was found not to be accurate enough to support modern positioning activities that occur in highly accurate electronic measurement systems and satellite-based positioning systems (Figure 3.1). NAD83 is an earth-centered datum and relies on an ellipsoid (and other constants) of the Geodetic Reference System of 1980 (GRS 80). It is important to note that Global Positioning System (GPS) position calculations are based on the World Geodetic System of 1984 (WGS 84) datum, which for all practical purposes is identical to GRS 80.

A vertical datum is a surface that represents heights above the geoid. The geoid is an approximation of sea level. Heights referred to the geoid are called orthometric heights, which stand in contrast to ellipsoidal heights, which refer to the ellipsoid. In the U.S. there are two vertical datums: the National Geodetic Vertical Datum of 1929 (NGVD29) and the North American Vertical Datum of 1988 (NAVD88). Superceding NGVD29, NAVD88 is a newly-defined and computed vertical datum, and provides a consistent, very accurate set of height values for cartographers, surveyors, and geodesists. One should note that the elevation of a given point can vary significantly depending on whether it is expressed in NGVD29 or NAVD88 values.

Figure 3.1. Expected Horizontal Change from NAD27 to NAD83 (WGS84) in Meters

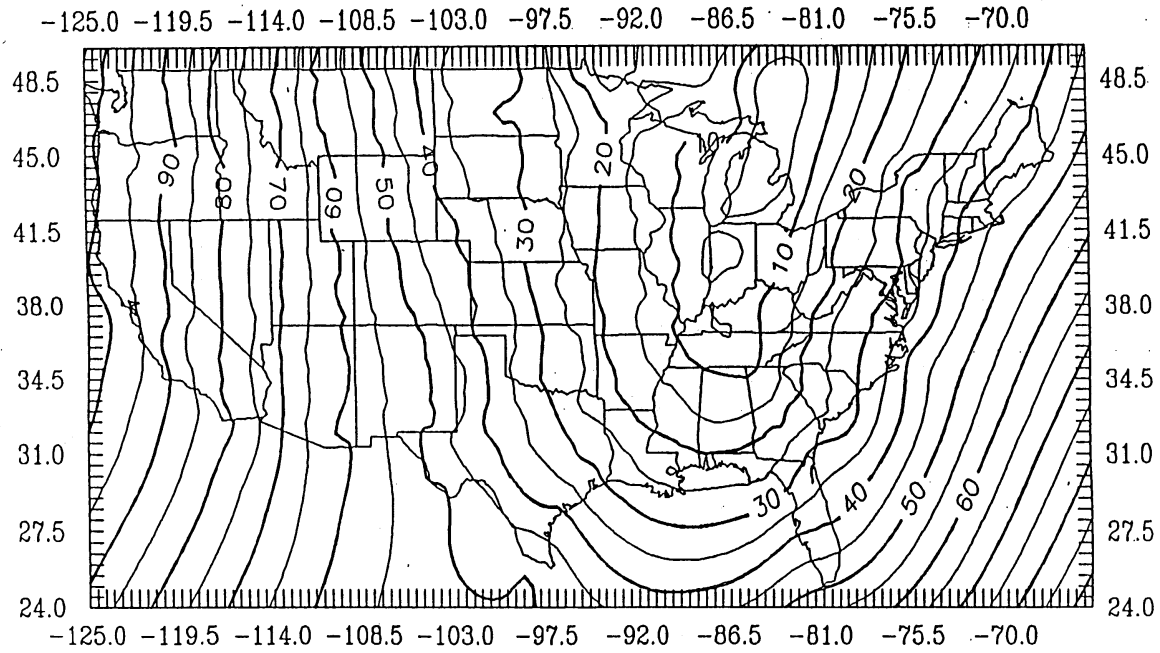
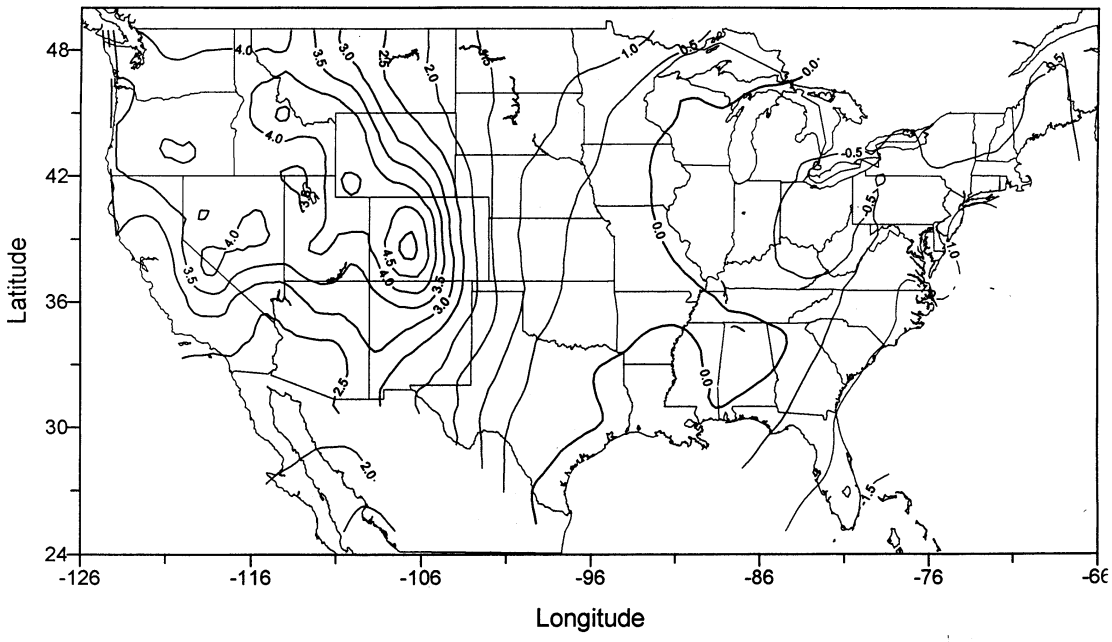
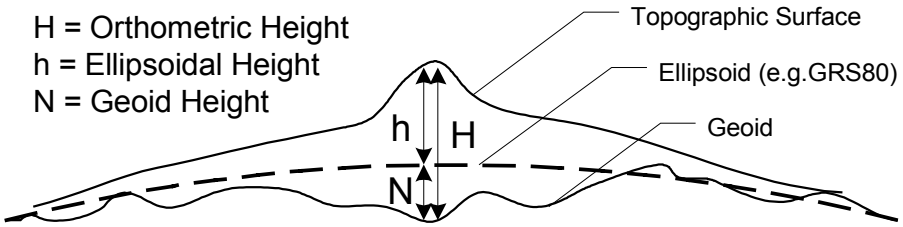


Figure 3.2 Expected Vertical Change from NAVD88 to NGVD29 in Feet



While elevations are not required for most parcel mapping applications, elevations and depths are required to support many business processes. Since GPS offers a three-dimensional solution, elevations are available for every point. This elevation data should be stored in the GIS. As mentioned earlier, the GPS-derived elevation refers to the ellipsoid (ellipsoidal height), not the orthometric height. (See Figure 3.3). Therefore, before one uses any elevation data it is imperative to identify the height system on which the elevation is based.

Figure 3.3. Ellipsoidal Height



3.2.3 High Accuracy Reference Networks (HARN)

The original NAD83 geodetic network was computed mostly by using traditional surveying observations and methods. Very few GPS observations were included in the adjustment computation. The design and implementation of this network preceded the developments of the GPS technology and therefore the practical usage of these control points for GPS applications can be problematic.

To remedy this situation many states developed a High Accuracy Reference Network (HARN). The HARN was designed to establish 'GPS-able' geodetic control points accessible 24 hours a day by car or light truck within, at most, 30 to 45 minutes travel. Once a HARN is established, a new adjustment is computed and the points in the network are assigned new coordinates (different from those of the original NAD83 adjustment).

3.2.4 The State Plane Coordinate System (SPCS)

It is impossible to map a curved Earth on a flat map using rectangular coordinates (x,y or northing, easting) without distorting angles, distances, or areas. It is possible to design a map projection such that some of the three are undisturbed or minimally distorted. The State Plane Coordinate System (SPCS) is a map projection system that minimizes angular distortions if only a small portion of the earth is flattened out. Thus, the SPCS is a rectangular (x,y or northing, easting) coordinate system describing geodetic positions of a limited area (a state or a portion of it) on a plane. The coordinates are computed by projecting latitudes and longitudes from a mathematical approximation of the earth (i.e., NAD27 or NAD83) onto a rectangular grid. SPCS consists of a set of mathematical relationships that are used to convert northings and eastings into latitudes and longitudes and vice versa. It also includes a set of formulas to compute the size and the direction of location displacement (positional error) resulting from the projection process.

The NILS project would include the tools to conduct these conversions.

3.2.5 Parcel Mapping

Data sources for parcel mapping fall into one of two general categories: primary or secondary data. Primary data sources include data compiled directly from field measurements using traditional surveying methods or GPS. The most common methods of producing parcel maps depend on secondary sources. Secondary data sources include data compiled from deeds, legal descriptions, survey maps or previously compiled hard copy parcel maps, such as tax maps. The quality of spatial data secondary sources depends not only on the accuracy of the descriptions and extractions but also on the ability of the cadastral mapper to interpret the information in the documents.

COGO, or *coordinate geometry*, is a computational method that converts secondary data sources, such as bearings or azimuths and distances into point coordinates. Using mathematical calculations, the COGO software transforms field measurements into geographic positions and spatial relationships.

Another type of computation called *least squares adjustment* is a statistically based computational method that also transforms measurements and data from secondary sources into geographic positions. The advantage of least squares over coordinate geometry is that the statistical quality of every geographic position is determined from the quality of the measurements or secondary sources that are used in the computation. Least squares also provides a simultaneous computation of any defined area. The disadvantage of least squares adjustment is that it may appear more complicated at first and it is not as familiar to most cadastral mappers as coordinate geometry.

The NILS project includes developing both of these types of tools into one environment called measurement management. Measurement management is the data and process to evaluate and apply a variety of observations and data for parcel data to achieve the best possible parcel map at any point in time.

3.2.6 Sources for Parcel Data

Parcel data are available from various sources. The most common data sets are the maps and deeds that can be found at in county courthouses across the country. In the federal government the BLM is designated as the official keeper of the land records for federally owned land. Other land agencies such as the Forest Service, Fish and Wildlife and the National parks also have land information that can be used to build parcel maps.

In some cases parcel maps have been generated by local governments to support tax mapping. In these cases a cadastral mapper has interpreted deeds and surveys and compiled those interpretations on to a hard copy map. Sometimes these paper maps are based on control surveys and sometimes they are representations that are not registered to the ground through control. Even though a tax map may not show bearings and distances, these parcel representations may be a good start for a local government in building a GIS. The NILS project would have tools to automate and transform these hard copy representations into a measurement management system where the data can be maintained into the future.

3.2.7 Quality Assurance and Quality Control

Quality control methods are applied throughout the creation of and maintenance of any parcel map. Quality assurances are the measures that are put in place to verify that the

quality control methods are being used and properly applied. The following are some quality assurance procedures that might be instituted in a parcel mapping program.

- *Visual Check*—compare the positions of parcel lines to orthophotography. Look for buildings crossing lot lines, lot lines that extend beyond the ROW lines, and lots that are not completely enclosed.
- *Distance Check*—Systematically check actual lot line lengths (those listed in the deeds) to the lengths computed in the GIS.
- *Statistical Error Check*—Using the principles of least squares analysis view the statistical error for computed points and compare these to the known points and to measurements of known quality.

The NILS project tools would provide for these and other quality assurance tools and methods.

3.2.8 Relating Attribute Data to Digital Parcels

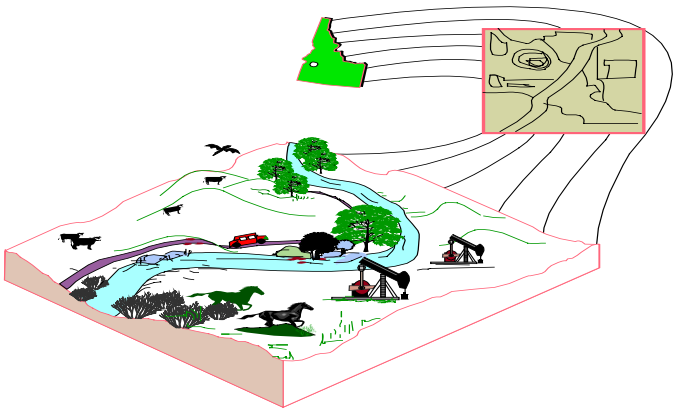
Attribute data provides richness to the GIS. It is parcel attribute data that forms the basis for most decision making. One of the most effective ways to enhance the benefits of a GIS parcel base is to incorporate data layers, such as tax assessment data, which are readily available at the municipal or county levels.

Each parcel in a GIS has a corresponding set of data 'behind the scenes.' Fields that are grouped into a record for each feature distinguish this underlying attribute data. It is this organizational structure that facilitates common GIS applications, such as graphically selecting a feature to retrieve the data linked to it in a feature attribute table. (See Figure 3.4.)

The NILS project supports adding any number of attributes and related text information to the digital parcel map. The tools for adding attributes and linking to existing systems is part of the functionality, but the specifics of which attribute information any location or jurisdiction may need are left to the end users.

Figure 3.4. The Vehicle for Linking All of the BLM's Activities and Land

NILS envisions the ability to make parcel-based land information available for all managers, specialists and the public in an organized automated environment.



3.3 Key Documents Related to Land and Survey Systems

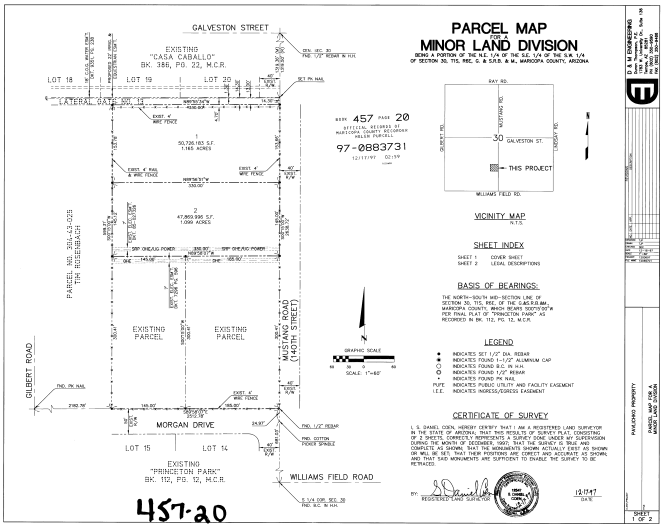
There are several familiar documents that are used to describe and transfer land ownership. These documents provide records of transactions. They are important to the NILS project because records of transactions are the basis of the data collected and used by land management agencies and many levels of government.

Perhaps the most familiar land-related document is the deed. There are two primary types of deeds: warranty deeds and quit claim deeds. Warranty deeds are used when the current owner and seller (grantor) warrants to the buyer (the grantee) that the rights and interests in the land are good. In a quit claim deed the owner or seller quits the interests they have in the land and passes any interests they may have to the buyer (grantee). It is actually possible to quit claim title to something you do not own to another person since you are not warranting that you have anything to convey.

Another type of document that is important to local and county governments is a survey plat. Traditional survey plats contain significant information in addition to the spatial configuration of land parcels. Capturing, editing and displaying this important information is performed by licensed professionals and done in accordance with applicable statutes and regulations. A survey plat describes the observations and measurements made by a licensed land surveyor. It establishes the rights and interests and the extent of land as observed and determined by the surveyor. Survey plats are important to NILS because they provide an important source for observations and measurements in the measurement system. Unlike the descriptions of land in deed, survey plat descriptions are known to be collected by a licensed land surveyor.

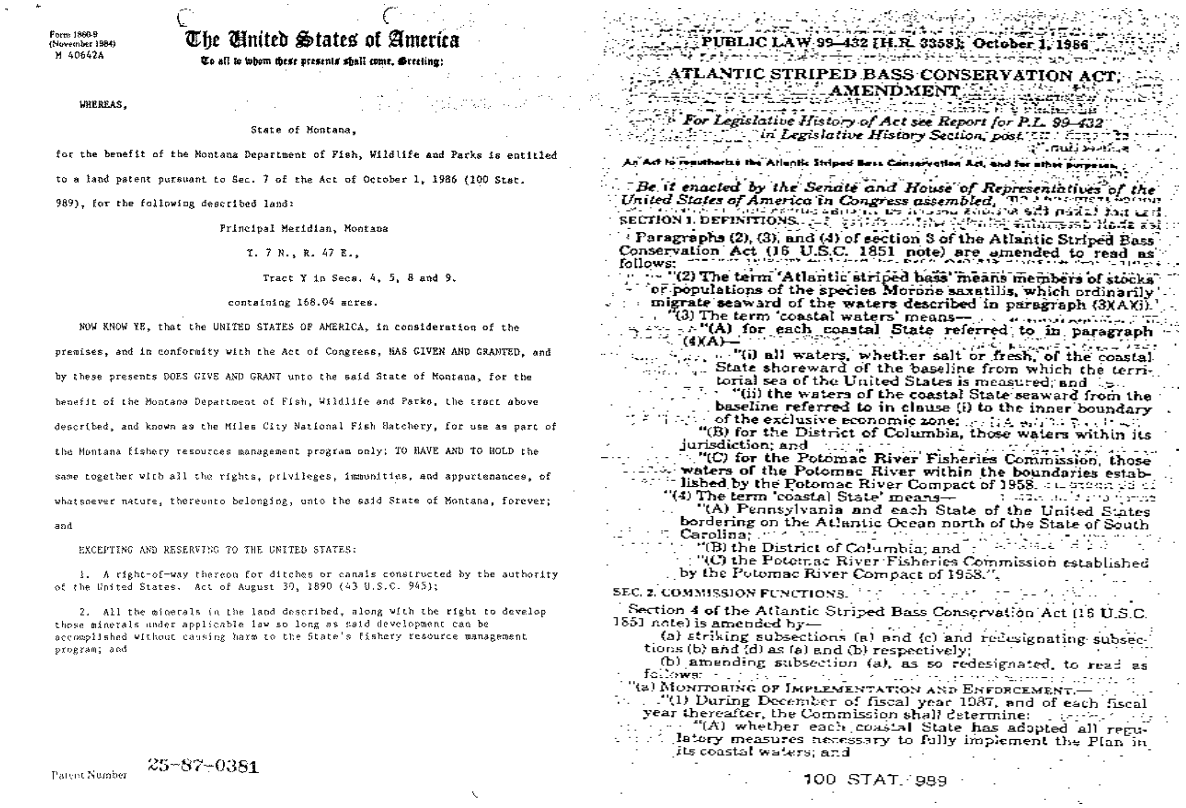
The requirements for survey plats vary from state to state. In some states they are called plats of survey or certified survey maps. Regardless of the name or the observation and reporting standards, all survey plats are collected by surveyors and contain important measurements for determining parcel boundaries and mapped features (Figure 3.5).

Figure 3.5. A Survey Plat



Government patents are special type of deed that conveys interest in land from the federal government to an individual or corporation. Government patents are special types of quit claim deeds. Once land passes from the federal government to another landowner, an original patent can never be issued again. Original patents are important to NILS because they often establish a beginning point for the status determination (Figure 3.6).

Figure 3.6. Patent (left) and Act of Congress Authority For Patent (right)



Form 1860-9
(November 1984)
M 40642A

The United States of America

To all to whom these presents shall come, Greeting:

WHEREAS,

State of Montana,

for the benefit of the Montana Department of Fish, Wildlife and Parks is entitled to a land patent pursuant to Sec. 7 of the Act of October 1, 1986 (100 Stat. 989), for the following described land:

Principal Meridian, Montana

T. 7 N., R. 47 E.,

Tract Y in Secs. 4, 5, 8 and 9.

containing 168.04 acres.

NOW KNOW YE, that the UNITED STATES OF AMERICA, in consideration of the premises, and in conformity with the Act of Congress, HAS GIVEN AND GRANTED, and by these presents DOES GIVE AND GRANT unto the said State of Montana, for the benefit of the Montana Department of Fish, Wildlife and Parks, the tract above described, and known as the Miles City National Fish Hatchery, for use as part of the Montana fishery resources management program only; TO HAVE AND TO HOLD the same together with all the rights, privileges, immunities, and appurtenances, of whatsoever nature, thereunto belonging, unto the said State of Montana, forever; and

EXCEPTING AND RESERVING TO THE UNITED STATES:

1. A right-of-way thereon for ditches or canals constructed by the authority of the United States. Act of August 30, 1890 (43 U.S.C. 945);

2. All the minerals in the land described, along with the right to develop those minerals under applicable law so long as said development can be accomplished without causing harm to the State's fishery resource management program; and

Patent Number 25-87-0381

PUBLIC LAW 99-432 [H.R. 3358]; October 1, 1986

ATLANTIC STRIPED BASS CONSERVATION ACT; AMENDMENT

For Legislative History of Act see Report for P.L. 99-432 in Legislative History Section, post

An Act to reauthorize the Atlantic Striped Bass Conservation Act, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. DEFINITIONS.

Paragraphs (2), (3), and (4) of section 3 of the Atlantic Striped Bass Conservation Act (16 U.S.C. 1851 note) are amended to read as follows:

"(2) The term 'Atlantic striped bass' means members of stocks or populations of the species Morone saxatilis, which ordinarily migrate seaward of the waters described in paragraph (3)(A)(i).

"(3) The term 'coastal waters' means—

"(A) for each coastal State referred to in paragraph (4)(A)—

"(i) all waters, whether salt or fresh, of the coastal State shoreward of the baseline from which the territorial sea of the United States is measured; and

"(ii) the waters of the coastal State seaward from the baseline referred to in clause (i) to the inner boundary of the exclusive economic zone;

"(B) for the District of Columbia, those waters within its jurisdiction; and

"(C) for the Potomac River Fisheries Commission, those waters of the Potomac River within the boundaries established by the Potomac River Compact of 1958.

"(4) The term 'coastal State' means—

"(A) Pennsylvania and each State of the United States bordering on the Atlantic Ocean north of the State of South Carolina;

"(B) the District of Columbia; and

"(C) the Potomac River Fisheries Commission established by the Potomac River Compact of 1958."

SEC. 2. COMMISSION FUNCTIONS.

Section 4 of the Atlantic Striped Bass Conservation Act (16 U.S.C. 1851 note) is amended by—

(a) striking subsections (a) and (c) and redesignating subsections (b) and (d) as (a) and (b) respectively;

(b) amending subsection (a), as so redesignated, to read as follows:

"(a) MONITORING OF IMPLEMENTATION AND ENFORCEMENT.—

"(1) During December of fiscal year 1987, and of each fiscal year thereafter, the Commission shall determine:

"(A) whether each coastal State has adopted all regulatory measures necessary to fully implement the Plan in its coastal waters; and

100 STAT. 989

3.4 Describing What We Own

When we think of land ownership we often think of what is called fee ownership or complete ownership. But in fact what we own is more likely characterized as a bundle of rights, sometimes referred to analogously as a bundle of sticks with each stick being a right in land. For example, the hunting rights, ingress and egress (the right to pass over) are examples of rights that may be separated from the fee or simple ownership to someone else. The collection of rights that can be given to others are sometimes called separable rights since they can be separated from the right of occupancy and enjoyment. In most states the mineral rights, sometimes called the mineral estate, can be separated from the surface rights. In recent times things like transferable development rights have also become separable rights.

The separable rights are important to NILS because to support federal land management and to determine the federal land ownership status all of the separable rights must be tracked through time.

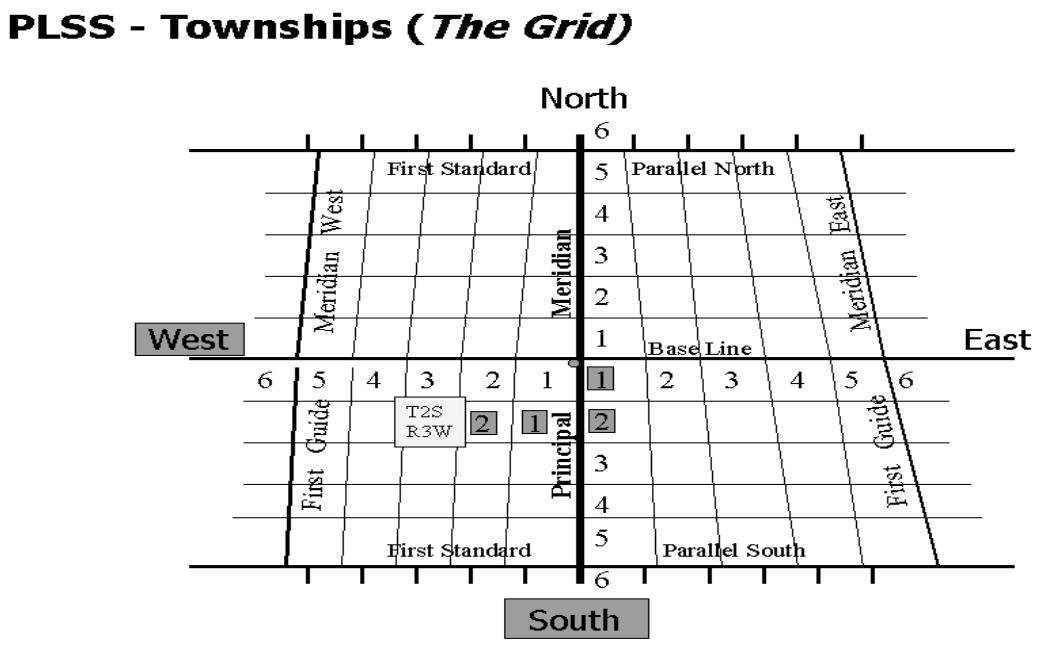
3.5 Describing the Extent of What We Own

3.5.1 History

In the first days of the nation settlements were made by chartered trading companies and merchant adventurers. The Plymouth and Virginia companies are two examples. The authority of these companies came from European thrones and sponsors. These groups had no methods or procedures for distributing land and held land as community ownership. As the colonies grew, land distribution was made in grants to individuals and groups and were described along natural and observable features.

After the Revolutionary War the first public domain was established as land held by the government. These public domain lands were the first lands held by the new nation. The first project to dispose of part of the public domain was the Northwest Ordinance passed by Congress in 1785. As part of this ordinance Thomas Jefferson devised a rectangular system of surveys called the Public Land Survey System (PLSS). The purpose of the PLSS was to inventory the land and to measure and divide it into predefined units for the orderly disposal of the land. The PLSS is based on nominally one mile by one mile areas, called sections. Thirty-six sections combined in a six mile by six mile block formed a PLSS Township (Figure 3.7). Today, the public land survey system dominates the land descriptions in the West. The regular grid areas became the basis for roads and land ownership and today the grid is visible from space. The public land survey system is not only a method of survey and measurement: it is the nation's first land inventory.

Figure 3.7 The Public Land Survey System



There are several notable exceptions to the use of the PLSS. Unlike other states, Texas was an independent republic at the time of its admission into the Union. The Texas methods for dividing and parsing out land are based on systems defined in the Republic. To this day

there are large single landowner tracts in Texas. The King's ranch in Texas is one of the largest privately held single tracts of land in the world. In the Southwest large Spanish land grants were brought into the Union as single blocks. These too came in under prior republic ownership. The third deviation from the rectangular system in the West is other grants of land that existed prior to the establishment of the rectangular system. Some of these are town sites, some are grants, or homesteads, but they all stand as islands of non-rectangular descriptions nested within the public domain.

3.5.2 Legal Descriptions

A discrete area of land may be described by narrative and geometry. The narrative version is what the land records community commonly refers to a **legal description**. It is this text version that is included in instruments of conveyance (deeds, patents), withdrawals (Executive Orders, Public Land Orders), and in leases, permits, and so on.

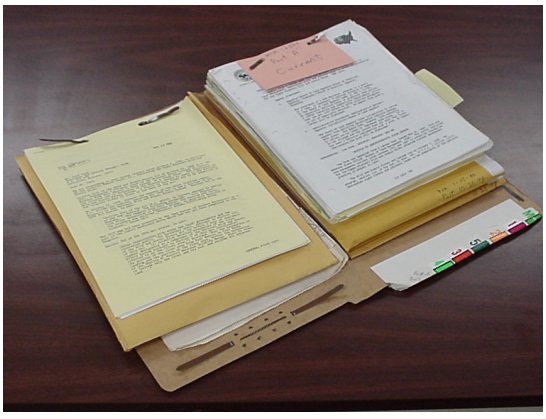
Legal descriptions typically have a geometry that can be located relative to some survey system. Categories of legal descriptions include the following:

- Area legal description (also known as an areal reference)—Examples of area legal descriptions are: geopolitical, PLS, Block-Lot, Mineral Survey, and irrigation lots. An area legal description is nominal; it is delimited in a reference survey system having area taxonomy, nesting and division rules.
- Perimeter legal description—Examples of perimeter legal descriptions are: record boundary, metes and bounds, sequenced set of bearings and distances, strip description, adjoiner description, riparian or aquatic area description, reference calls to natural features (e.g., contour, ridgeline, watercourse).
- Portion/remainder legal description—Examples are: area as a quantity {e.g., 'north sixty acres of…', 'the north four-hundred feet of…'), exclusions; other reference calls; ambiguous areas that cannot be mapped relative to any reference.

3.6 BLM Examples of Land Records

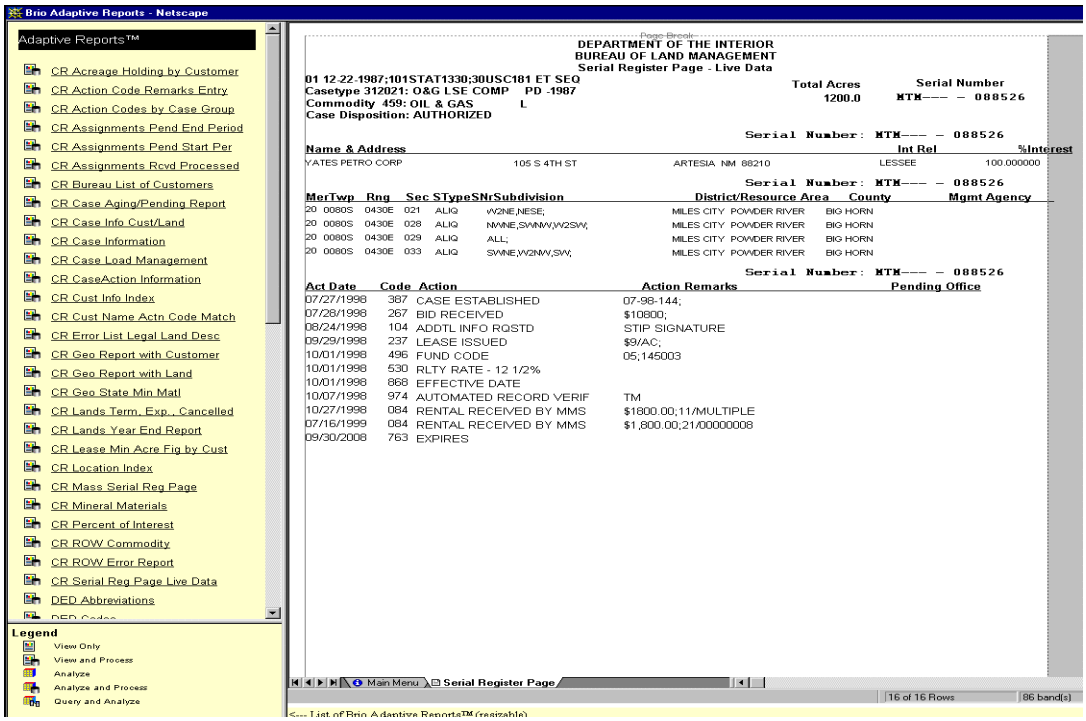
Case File—A record that documents a specific action, event, person, place, or project, such as serialized land and mineral files, and grazing files (Figure 3.8).

Figure 3.8. A Case File



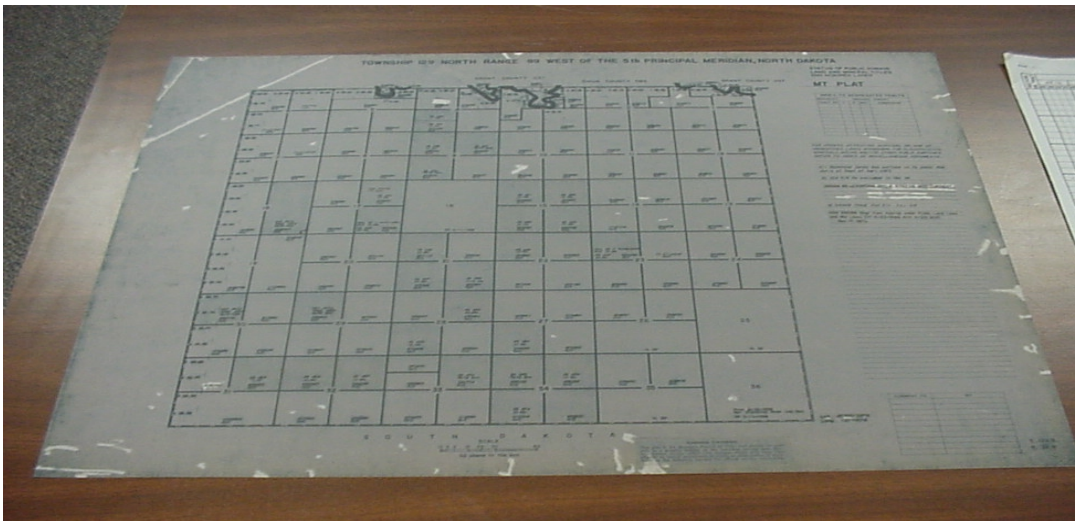
Serial Register (SRP)—A case record which consists of serial pages bound in volumes in a public room, on microfiche, or in a computer data file (Figure 3.9).

Figure 3.9. A Serial Register in a Report Viewer



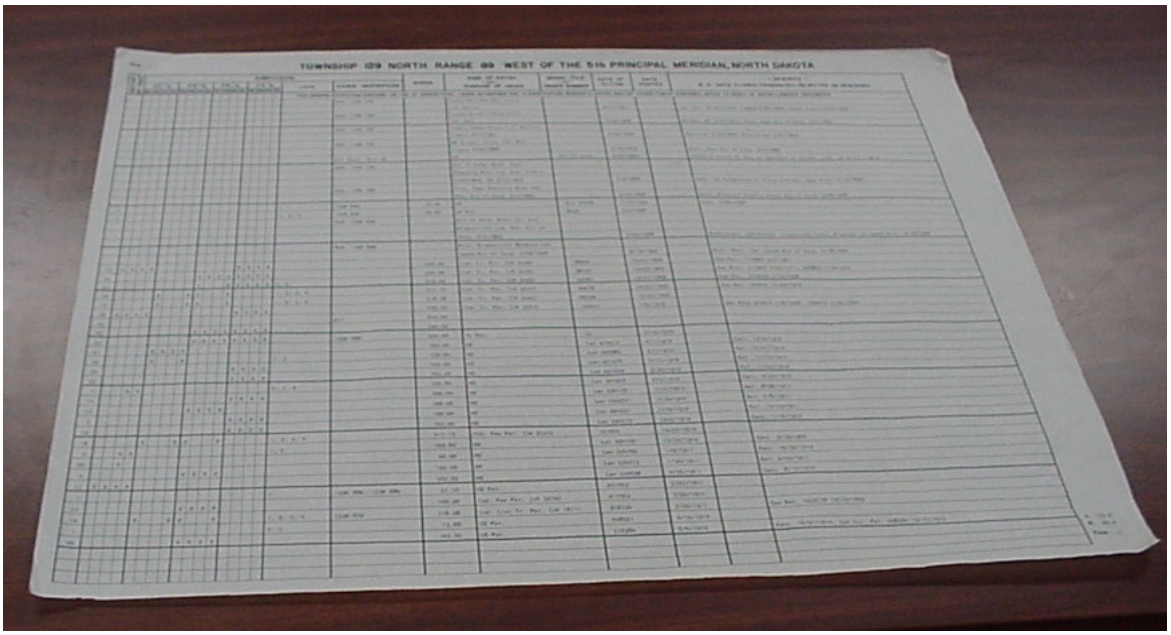
Master Title Plat (MTP)—A composite of the survey plats of each township on which is shown the ownership and land status (Figure 3.10).

Figure 3.10. An Original Master Title Plat Printed on Mylar



Historical Index (HI)—Works hand in hand with MTP above. An HI is a chronological narrative of all past and present actions, which affect the use of or title to public lands and resources (Figure 3.11).

Figure 3.11. An Original Historical Index Printed on Vellum



Control Document Index (CDI)—An index consisting of microfilmed copies of patents and deeds that convey title to and from the United States. It also includes microfilmed copies of documents that affect or have affected control, or limit or restrict the availability of right, title or use of Federal lands. The CDI microfilm cards are arranged chronologically within townships by state, meridian, range and township (Figure 3.12).

Figure 3.12. A Control Document Index Cabinet

3.7 Examples of State and Local Government Land Records

Register of Deeds

When dealing with land ownership, a County Recorder or Register of Deeds is likely to perform any or all of the following duties:

- Record documents (such as deeds) pertaining to real estate property, and collect fees set by statute
- Make acceptable legal documents a matter of permanent public record
- Make a microfilmed or optically scanned digital copy of the recorded documents
- Index documents so they may be located in the future
- Maintain cross-referencing indexes to recorded records
- Maintain a set of plat maps which show the current ownership of every tract of land in the county
- Make records available for public inspection
- Provide copies of documents (usually for a fee)
- Record information updates, such as name changes
- Index recorded documents by the names of the principal parties, by the location of the land (abstract), and by the kind of instrument
- Provide certified replacement copies for lost originals

In general, when dealing with transactions, a County Recorder's role is *passive*. This means that recorders are observers of transactions, but not participants in the transactions. Recorders are most interested in the **record** of the transaction.

An agency like the BLM, on the other hand, is an *active* participant and is interested in the rights associated with the transaction, such as monitoring leased allotments, or converting land uses. The BLM makes decisions on how the land will be used while transactions are taking place. County recorders generally document transactions, without being involved in the decisions about uses of the land. Explanation of passive and active roles for land records management is contained in Appendix D.

The list below describes a typical series of steps that a County Recorder's office might go through when recording a document pertaining to rights and interest in property, such as a deed.

1. The original document is recorded with a date and time.
2. The document may be stamped or otherwise noted with information about fees and/or taxes.
3. Any accompanying affidavits and powers of attorney are recorded and indexed.
4. A copy of the document is indexed and filed.
5. The original document is returned to the customer, who is charged a fee for the recording of their document.

6. Documents are preserved, and may be in books, on microfilm/microfiche, and/or scanned and stored digitally.
7. Duplicate copies are stored off site, in secure locations, vaults, archives, etc.
8. Information on real property transactions (deeds which convey rights and interests in land between grantors and grantees), is passed along to the Assessor's and Treasurer's Offices.
9. Information for Department of Revenue tax reference may pass through the Recorder's office, but may not be recorded.
10. The tract index and plat map are updated with information about the property from the recorded document.
11. If the transaction is the creation of a subdivision, documents for the new block and lot descriptions are indexed, and the survey plat is updated.

County recorder activities frequently entail additional steps than those summarized above, such as noting information for property in dispute or litigation, agreements between corporations, and tax liens (e.g., property tax management and land use regulation).

3.8 NILS and Standards

Because NILS is sponsored by federal agencies, it is essential that NILS provides a data model that supports compliance with the relevant federal data standards. The NILS data model will be an implementation framework that individual agencies may customize as required. State and local NILS users may implement modified versions of the data model and NILS will provide functionality to support the inter-agency data sharing and exchange that is fundamental to a National Integrated Land System.

At the federal level, the primary data content standards come from the Federal Geographic Data Committee (FGDC), which was formed by OMB Circular A-16 to support the development and maintenance of a National Spatial Data Infrastructure (NSDI). More information on the NSDI and FGDC can be found at **http://www.fgdc.gov**.

There are several important FGDC standards that are being leveraged by the NILS project. The first is the Cadastral Data Content Standard. This standard was first approved in December 1996 and it forms a basis for describing the syntax or common definition of objects or items used to describe land ownership. The following describes how the Cadastral Data Content Standard might apply to a County Recorder or Register of Deeds as an example of what is meant by content standard.

The left column of Table 3.1 contains a list of real property and cadastral data typically recorded and stored by County Recorders and Registers of Deeds. The right column contains the corresponding Cadastral Data Content Standard entity and attribute.

Overall, the table lists a potential of twenty-seven connections between commonly used County Recorder data and the FGDC Cadastral Data Content Standard. This represents twenty-nine links, key terms, or relate items—in other words, a wealth of capability to work not only with standardized definitions but to use these definitions as understandable links between multiple agencies and varying databases.

Table 3.1 illustrates the following:

1. The Cadastral Data Content Standard offers a significant range of definitions and terminology for data commonly used by county recorders.
2. There are likely to be some attributes in the Cadastral Data Content Standard that county recorders may not use. For example, the list of typical county recorder data above does not include information on restrictions, found in the Standard.
3. Likewise, there are likely to be elements in local data that are not included in the Cadastral Data Content Standard, such as information about tax districts and street names.

County Recorder offices (and other county departments) can make use of many of the Cadastral Data Content Standard's attributes to link their data with other departments, as well as with other County, State, and Federal agencies, and business dealing with real property and cadastral information.

A second important FGDC standard is the Geospatial Metadata Content Standard. This standard describes how data about data or information about the lineage, quality, source contact, and possible intended use of data. These data are extremely important if information is posted to the Internet shared or used by anyone other than the data producer. cadastral data falls into this category on all counts. As an implementation framework, the NILS data model will provide support for embedding FGDC-compliant metadata.

The ALTA (American Land Titles Association) standards provide definitions for what should be included in a survey done for a lending institution or for a private landowner. It includes recommendations about information such as historical use of the land, floodplain and wetlands locations, underlying geological conditions, mineral rights, and any element that may cloud or affect title to the land. While the NILS data model as a framework will not directly implement ALTA standards, the NILS data model would support a custom database implementation if a user agency needed to achieve compliance with the ALTA standard.

Cadastral and land ownership data have unique database implementations by individual user agencies. This creates a true patch work quilt of quality, completeness, and consistency across the nation. One of the goals of the NILS project is to provide the tools to develop a common backing to this quilt fabric that can be used by all governmental units.

The Manual of Instructions for the Survey of the Public Lands of the United States, 1973 is an example of standards that describe techniques of survey from 'field to fabric' for BLM surveyors (Figure 3.13).

Table 3.1. County Recorder Data and Corresponding CDCS Entities

County Recorder Data	Cadastral Data Content Standard Entity or Attribute
County	Public Agency/County
State	Public Agency/State
Town	Public Agency/City-Village-Town
County Recorder Office	Public Agency/Public Agency Name
Recorder's indexing number	Transaction/Transaction ID
County Recorder	Transaction/T-Source Agent
Book, Page	Transaction/T-Source Index
Date Recorded	Transaction/Recorded Date
Time Recorded	Transaction/Recorded Time
Parcel Number	Parcel/Parcel Local Label
Survey Meridian and Baseline	PLSS Description/Origin of Public Land Survey System
Township	PLSS Township/Township Number
Range	PLSS Township/Range Number
Direction	PLSS Township/Township Direction (or Range Direction
Section	PLSS Township First Division/Type
Section Number	PLSS Township First Division/Designator
Quarter Section	PLSS Township Second Division/Second Division Type
Quarter Quarter Section (16th)	PLSS Township Second Division/Second Division Type
Block	PLSS Township Second Division/Second Division Type
Lot	PLSS Township Third Division/Third Division Type
Parcel	PLSS Township Third Division/Third Division Type
Boundary Azimuth or Bearing	Straight Line/Direction Value
Boundary Distance	Straight Line/Distance Value
Acres	Parcel Area/Parcel Area Unit
Quantity of Acres	Parcel Area/Parcel Area Quantity
Monument Description	Corner Point/Monument Type
Land Surveyor's Name	Agent/Agent Name
Date of Survey	Legal Area Descriptions/LAD Source Date
Owner Name	Agent/Agent Name

Figure 3.13. Example Description of 'Field-to-Fabric' Survey Techniques

quently this permits their complete showing on the base drawing.

Occasionally it is feasible to letter the number and name of each claim on the base drawing. More often this is impracticable, and serial numbers for the purpose of indexing only should be assigned to all segregated locations throughout the township and carried to a marginal table followed by the survey number and name of each location. When this is done only the serial numbers are shown on the face of the drawing. Where a number of mineral surveys are segregated, large scale drawings on additional sheets may be required for each of the sections invaded. An outline of the mineral surveys is shown on the base plat for the sections involved, and a marginal reference is made on the base drawing calling attention to the sheets upon which the segregations in the various sections may be found. In many instances an enlarged diagram on the base plat will obviate the necessity for an additional sheet. Figure 84 (discussed in section 9–74) is an example of a drawing which should be shown as an enlarged diagram on the base plat.

9–10. Transparent color overprints are employed for those plats where topographic features tend to obscure the essential data on the base drawing. Overprints are not required where these features may readily be shown in black on the base drawing.

DRAFTING THE BASE DRAWING

9–11. Township plats are generally drawn on the scale of 1 inch equals 40 chains, on sheets 19 x 24 inches when trimmed. The scale is often enlarged to 1 inch equals 20 chains for showing portions of townships in detail; the scale of 1 inch equals 10 chains or larger is employed where necessary. A bar or graphic scale stating only the unit of measurement is shown on all plats. The size of the sheets is always made 19 x 24 inches, regardless of the scale or area to be show; this is important on account of the need for uniformity in the dimensions of filing devices. A borderline rectangle 16½ x 20 inches is right for the normal township plat; the size of the rectangle may be varied slightly when necessary. Generally the drawing is placed to the left of the center of the sheet, thus allowing space for the memorandum and other data in the margin to the right and resulting in a better balanced plat.

9–12. The plat subject should be compiled or laid out with a good grade, medium hard drawing pencil, one which will make a clean mark, but not so hard that it will engrave the lines.

9–13. The township is drafted as a plane, without allowance for reduction from the spheroid, as is required in the making of small-scale topographic maps showing large areas. All *regular* townships are laid out as a rectangular grid, with allowance for fractional measurements along the north tier and west range of sections.

9–14. In the case of *irregular* townships, or those containing meanderable bodies of water, or irregular tracts, the drawing should be laid out from the field closing sheets, duly balanced. The point of origin is selected on the drawing, from which point the exteriors are carefully laid out, each salient being accurately located by scaling, from the point of origin, the balanced values of the total latitude and departure of that salient. The section boundaries are then laid out similarly from suitable points of origin on the exteriors. Finally the subdivisions of each section, including the necessary lines of segregation and meander lines, are accurately scaled by the method of total latitudes and departures from an origin on the section boundary. On this plan the work may be laid out without introducing accumulative errors of scaling.

9–15. Elements of triangulation figures and offset lines are not shown on the plat when the field procedure results in ascertaining the course and length of the line established. Such diagrams are shown in the field notes if needed for a clear understanding of the procedure but are not required on the plat.

9–16. Plats of entire townships show the complete condition of all exteriors, including closing and standard township and section corners, with connecting courses and distances (figure 81). The connecting courses and distances are omitted where the scope of the work is not sufficient to determine the relationship accurately. A line common to two townships is